

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Claims 1, 4, 10, 13, 16 and 19 have been amended.

Claims 21-25 have been added. Claims 21-24 further clarify that which applicants regard as the invention. New Claim 25 includes the limitations that the Examiner has indicated as overcoming all the prior art of record.

Support for the claim amendments and the new claims can be found in the originally filed specification at paragraphs [0030] and [0032]-[0036].

No new matter has been added.

Rejection under 35 USC § 103

Claims 1, 3, 8-10, 12, 16, and 18, and Claims 4, 13 and 19

The Examiner continues to reject claims 1, 3, 8-10, 12, 16, and 18 under 35 U.S.C. 103(a) as being unpatentable over Robles et al. (U.S. Publication No. 2004/0005089 A1) in view of Papadopoulou et al. (U.S. Patent No. 6,178,539 B1). Claims 4, 13 and 19 stand rejected under 35 USC § 103 as being obvious from Robles in view of Papadopoulou and LaCour U.S. Patent Publication No. 2002/0155357.

Applicants disagree and traverse the rejections of record.

As is currently recited, the claims are directed to methods, program storage devices and articles implementing methods of creating a photomask layout for projecting an image of an integrated circuit design. A layout of spaced IC shapes to be projected via the photomask is created followed by creating Voronoi cells around these spaced IC shapes. Bisectors are then determined between adjacent ones of the spaced

IC shapes, whereby each bisector is a locus of points equidistant from edges of the adjacent IC shapes and define shared boundaries of adjacent Voronoi cells. Based on the vertices of the bisectors, different types of bisectors are determined, and then SRAFs are created between adjacent ones of the spaced IC shapes based on these different types of bisectors.

In so doing, if the bisectors are of a first type of bisectors, then the sub-resolution assist features extend along these first types of bisectors to a first vertex of their respective bisectors and extend beyond the second vertex of such bisectors. If the bisectors are of a second type of bisectors, then the sub-resolution assist features extend along the second type of bisectors with ends terminating on and equidistant away from vertices of such second type of bisectors. However, if the bisectors are of a third type of bisectors, at least a pair of sub-resolution assist features are positioned on opposing sides of their respective bisector, each between one of the adjacent shape edges and such bisector, whereby upper ends of each of the pair of sub-resolution assist features terminates a distance beyond the ends of their respective adjacent shape edges.

That is, applicants have amended the claims to clarify the present unique methods of how sub-resolution assist features (SRAF) are positioned and placed in accordance with the invention. The present invention uses the locations of the vertices of bisectors (which are the vertices of edges of Voronoi cells) to define different types of bisectors, which, in turn, are used to determine both the location of placement of the SRAFS as well as the lengths thereof, therein enabling extension of such SRAFs beyond the IC shapes.

Applicants continue to submit that Robles does not disclose or suggest Voronoi cells, and does not use bisectors that define shared boundaries of adjacent Voronoi

cells. Again, Robles discloses SRAF 335 that does not extend beyond feature 310 or 320. (Robles, Fig. 3.) It only discloses that "edges 330 and 340 receive SRAF 335 centered between them." (Robles, paragraph 0017.) Papadopoulou does not overcome this deficiency since it is limited to the use of Voronoi diagrams to compute critical areas for shorts between different conducting regions of a layout. Papadopoulou does not use any boundaries of Voronoi cells to create sub-resolution assist features, as in applicants' claimed invention. Accordingly, applicants continue to submit that one of ordinary skill in the art would not look to combine the Robles and Papadopoulou references.

Neither Robles nor Papadopoulou, alone or in combination, disclose or suggest creating Voronoi cells around spaced IC shapes, determining bisectors representing defined shared boundaries of adjacent Voronoi cells (and are equidistant from edges of adjacent IC shapes), whereby different types of bisectors are determined based on the vertices thereof. As such, neither Robles nor Papadopoulou, alone or in combination, disclose or suggest creating SRAFs between adjacent ones of the spaced IC shapes based on these different types of bisectors.

The Examiner has already recognized that Robles in view of Papadopoulou does not teach identifying different types of vertices for the bisectors. To overcome this deficiency, the Examiner cites LaCour, asserting that in accordance with dictionary definitions, LaCour discloses the use of vertexes and bisectors, and describes classification with the type of vertices of bisectors (e.g. a "+" shaped vertex is changed to "L" shaped). However, applicants point out that these bisectors of LaCour are not bisectors (and as such, vertexes) that define shared boundaries of adjacent Voronoi cells, as is currently claimed. Further, applicants submit that LaCour does not teach or

suggest identifying different types of bisectors, and then creating SRAFs in locations based on these different types of bisectors, as is claimed.

Neither Robles, Papadopoulou nor LaCour, alone or in combination, teach identifying different types of bisectors between adjacent Voronoi cells, and then using these different types of bisectors, creating SRAFs between adjacent IC shapes whereby the locations, lengths and positioning of such SRAFs are determined based on these different types of bisectors, as is currently claimed.

In view of the foregoing, it is submitted that one skilled in this art would not arrive at applicants' claimed invention from the hypothetical combination of these references. Applicants submit that the rejection is based on hindsight only after reading applicants' specification.

Claims 5, 6, 14, 15 and 20

Claims 5, 6, 14, 15 and 20 stand rejected under 35 USC § 103 as being obvious from Robles in view of Papadopoulou and Lucas et al. U.S. Patent Publication No. 2004/0248016. Applicants disagree.

Dependent claims 5, 6, 14, 15 and 20 describe extending at least some of the sub-resolution assist features beyond the bisectors on which they are created, and extending at least some of the sub-resolution assist features beyond the bisectors on which they are created to connect to other sub-resolution assist features. Lucas has been cited to render obvious these methods.

Lucas makes no mention of extending sub-resolution assist features beyond bisectors as defined by applicants. Lucas does not disclose or suggest the extension of sub-resolution assist features along bisectors defined by shared boundaries of adjacent Voronoi cells. Lucas merely links sub-resolution assist features in a manner unrelated

to applicants' claimed method. Accordingly, there is no disclosure of applicants' claimed method in the combination of Robles and Lucas.

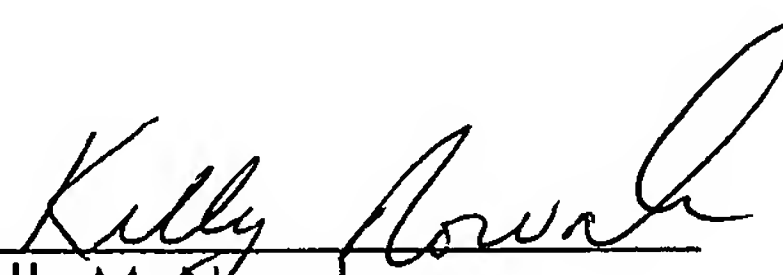
Claim 7

Claim 7 stands rejected under 35 USC § 103 as being obvious from Robles in view of Papadopoulou and Frankowsky U.S. Patent Publication No. 2002/0182523. Applicants disagree.

Dependent claim 7 recites removing at least one of the sub-resolution assist features along the bisectors prior to finalizing the photomask layout. Frankowsky does not disclose or suggest the removal of sub-resolution assist features along bisectors defined by shared boundaries of adjacent Voronoi cells. Frankowsky merely removes scatter bars in a manner unrelated to applicants' claimed method. Therefore, there is no disclosure of applicants' claimed method in the combination of Robles and Frankowsky.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,


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